

App. No. 09/773,438

HO-P02104US0

b.) Claims

1. (Currently Amended) A method for the reduction of fouling of process components within a liquid hydrocarbon stream comprising the steps of:

applying an electric charge to an object within the flow path of said liquid hydrocarbon stream, wherein said electric charge is applied substantially continuously throughout said process, and wherein said liquid hydrocarbon stream contains contaminants;

flowing said liquid hydrocarbon stream past said electric charge; and,

adjusting the magnitude of said electric charge while continuing said flowing step.

2. (Withdrawn) The method according to Claim 1, wherein said step of applying an electric charge to an object comprises applying an electric charge to an object upstream to downstream of a heat exchanger.

3. (Withdrawn) The method according to Claim 2, wherein said step of applying an electric charge to an object upstream of a heat exchanger comprises applying an electric charge to an auxiliary device immediately upstream of a heat exchanger.

4. (Withdrawn) The method according to Claim 3 wherein said step of applying an electric charge to an auxiliary device immediately upstream of a heat exchanger comprises applying an electric charge to an object selected from the group consisting of a vessel, a section of pipe, and a spare heat exchanger.

5. (Original) The method according to Claim 1, wherein said step of applying an electric charge to an object comprises applying an electric charge to a heat exchanger.

App. No. 09/773,438

HO-P02104US0

6. (Original) The method according to Claim 5, wherein said step of applying an electric charge to a heat exchanger comprises applying an electric charge to the chassis or shell of said heat exchanger.

7. (Withdrawn) The method according to Claim 5, wherein said step of applying an electric charge to a heat exchanger comprises applying an electric charge to baffles of said heat exchanger.

8. (Withdrawn) The method according to Claim 5, wherein said step of applying an electric charge to a heat exchanger comprises applying an electric charge to a floating head of said heat exchanger.

9. (Withdrawn) The method according to Claim 5 wherein said step of applying an electric charge to a heat exchanger comprises applying an electric charge to one or more tubes or to the tube bundle of said heat exchanger.

10. (Withdrawn) The method according to Claim 1 wherein said step of applying an electric charge to an object comprises applying an electric charge to a slurry settler.

11. (Withdrawn) The method according to Claim 10 wherein said step of applying an electric charge to a slurry settler comprises applying an electric charge to the conical section of a slurry settler.

12. (Original) The method of Claim 1 wherein said step of applying an electric charge comprises applying a constant electric charge.

13. (Withdrawn) The method of Claim 1 wherein said step of applying an electric charge comprises applying a modulated electric charge.

App. No. 09/773,438

HO-P02104US0

14. (Previously Presented) The method of Claim 1, further comprising determining the level of contaminants in the liquid hydrocarbon stream.

15. (Previously Presented) The method of Claim 14 wherein said step of determining utilizes measurement of the turbidity of the fluid stream or an analytical measurement indicative of contaminant concentration of the liquid hydrocarbon stream.

16. (Withdrawn) The method of Claim 1 wherein said step of applying an electric charge comprises applying an attractive electric charge.

17. (Withdrawn) The method of Claim 1 wherein said step of applying an electric charge comprises applying a repulsive electric charge.

18-26. (Canceled).

27. (Currently Amended) A method for improved hydrocarbon refining efficiency comprising the steps of:

catalytically cracking a liquid hydrocarbon mixture to produce an output mixture enhanced in low molecular weight liquid hydrocarbons relative to said hydrocarbon mixture;

separating by distillation said output mixture into petroleum fractions;

drawing a liquid hydrocarbon stream from said petroleum fractions;

flowing said liquid hydrocarbon stream through a heat exchanger;

repeating said step of separating or said steps of catalytically cracking and separating on said liquid hydrocarbon stream;

applying an electric charge to an object within the flow path of said liquid hydrocarbon, wherein said electric charge is applied substantially continuously throughout said process;

App. No. 09/773,438

HO-P02104US0

flowing said liquid hydrocarbon stream past said electric charge; and,

adjusting the magnitude of said electric charge while continuing said flowing step.

28. (Currently Amended) An improved hydrocarbon refining apparatus comprising:

a catalytic cracking unit to receive a liquid hydrocarbon mixture;

a distillation column fluidly coupled to said catalytic cracking unit and receiving the output of said catalytic cracking unit;

a heat exchanger fluidly coupled to said distillation column and receiving at least a part of the output of said distillation column;

a substantially continuous voltage source in electrical contact with a component of said apparatus within the flow stream of said ~~receiving at least a part of the output of distillation column~~ liquid hydrocarbon mixture or said output said of distillation column.